

# Continuous Integration Testing

Continuous Integration (CI) testing is a crucial practice in software development that ensures code quality and reliability by automating the testing process. In this document, we will explore how to implement CI testing using GitHub Actions as our CI tool in the context of our swe group project. Our project is built using the **Django-React** stack, and we used **Jest** for unit testing.

## Popular CI Tools

1. **Jenkins:** An open-source automation server that supports building, deploying, and automating projects.
2. **Travis CI:** A hosted CI service used to build and test projects hosted on GitHub and Bitbucket.
3. **CircleCI:** A cloud-based CI/CD platform that automates the software development process.
4. **GitHub Actions:** Provides CI/CD capabilities integrated directly into GitHub repositories, suitable for our Django-React project.
5. **GitLab CI/CD:** Integrated into GitLab, it provides CI/CD pipelines as part of GitLab's DevOps capabilities.

## Step 1 - Choose GitHub Actions as CI Tool:

GitHub Actions is a continuous integration and continuous delivery (CI/CD) platform that allows us to automate your build, test, and deployment pipeline. We can create workflows that build and test every pull request to our repository, or deploy merged pull requests to production.

## Step 2 - Understanding Branches:

In our project, we have multiple branches, including **'main'**, **'shreya'**, **'ajoy-sarker'**, **'minhaj'**, **'rasel'**, **'moon'**. Each branch represents a different development environment or feature branch where we work on specific tasks.

### **Step 3 - Setting Up CI Pipeline:**

Terms commonly used in CI/CD Pipeline:

- **Workflow:** A workflow is a unit of automation from its start to finish, including the definition of what triggers the automation, what environment or other aspects should be taken into account during the automation, and what should happen as a result of the trigger.
- **Job:** A job is a section of the workflow, and is made up of one or more steps. In this section of our workflow, the template defines the steps that make up the build job.
- **Step:** A step represents one effect of the automation. A step could be defined as a GitHub Action, or another unit, like printing something to the console.
- **Action:** An action is a piece of automation written in a way that is compatible with workflows. Actions can be written by GitHub, by the open source community, or we can write them ourselves.

We will create a CI pipeline using GitHub Actions to automate the testing process whenever code changes are pushed to the repository. This pipeline will consist of the following stages:

1. **Checkout Repository:** This step ensures that the latest code changes are retrieved from the repository.
2. **Install Dependencies:** Install project dependencies using npm or yarn.
3. **Run Tests:** Execute unit tests using Jest to ensure code correctness.

### **Step 4 - Configuring CI Workflow:**

We will create a **YAML** configuration file (‘**.github/workflows/main.yml**’) in the root directory of our project repository to define the CI workflow. This file will specify the steps to be executed in the CI pipeline. To create a YAML configuration file in our project repository, we will follow these steps:

1. Navigate to the root directory of our project repository.
2. Create a new file named `.github/workflows/main.yml`. We can do this using a text editor or through our command line interface.
3. Open the `main.yml` file in preferred text editor.
4. Write the YAML configuration for our CI workflow in this file. Below is an example of a basic CI workflow configuration:

```
name: CI

on:
  push:
    branches:
      - shreya

jobs:
  build:

    runs-on: ubuntu-latest

    steps:
      - name: Checkout repository
        uses: actions/checkout@v2

      - name: Set up Node.js
        uses: actions/setup-node@v2
        with:
          node-version: 14

      - name: Install dependencies
        run: |
          cd frontend
          npm install

      - name: Run tests for CartScreen
        run: |
          cd frontend
          npm test CartScreen.test.js

      - name: Run tests for OrderScreen
        run: |
          cd frontend
          npm test OrderScreen.test.js
```

```

- name: Set up Python
  uses: actions/setup-python@v2
  with:
    python-version: 3.8

- name: Install Django dependencies
  run: |
    cd backend
    pip install -r requirements.txt

```

5. Save the changes to the main.yml file.
6. Commit the main.yml file to your repository

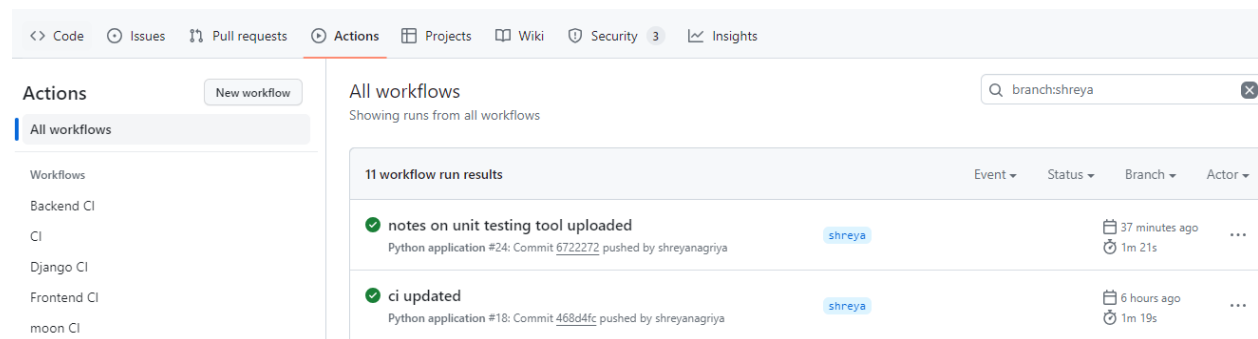
```

git add .github/workflows/main.yml
git commit -m "Add CI workflow configuration"
git push origin <branch-name>

```

## **Step 5 - Monitoring CI Results:**

Once the CI pipeline is set up, we can monitor its execution by navigating to the "Actions" tab in our GitHub repository. We should review the test results and logs generated by GitHub Actions to identify any failures or issues.



The screenshot shows the GitHub Actions interface. The top navigation bar includes links for Code, Issues, Pull requests, Actions (selected), Projects, Wiki, Security, and Insights. The left sidebar shows the 'Actions' section with a 'New workflow' button and a list of workflows: All workflows, Workflows, Backend CI, CI, Django CI, Frontend CI, and moon CI. The main area displays 'All workflows' with a search bar set to 'branch:shreya'. Below this, it shows '11 workflow run results' with columns for Event, Status, Branch, and Actor. Two runs are visible:

Event	Status	Branch	Actor
notes on unit testing tool uploaded	Success	branch:shreya	shreya
ci updated	Success	branch:shreya	shreya

Summary

Jobs

build

Run details

Usage

Workflow file

## build

succeeded 6 hours ago in 1m 10s

Beta

Give feedback

Search logs



> ✓ Set up job	1s
> ✓ Checkout repository	1s
> ✓ Set up Node.js	4s
> ✓ Install dependencies	39s
> ✓ Run tests for CartScreen	4s
> ✓ Run tests for OrderScreen	4s
> ✓ Set up Python	0s
> ✓ Install Django dependencies	14s
> ✓ Post Set up Python	0s
> ✓ Post Set up Node.js	0s
> ✓ Post Checkout repository	0s
> ✓ Complete job	0s

## **Step 6 - Integrating CI with Pull Requests:**

To ensure that code changes are thoroughly tested before merging into the main branch, we can configure GitHub Actions to run tests automatically on pull requests. This allows us to review the test results and ensure that their changes do not introduce any regressions.

By implementing CI testing using GitHub Actions in our group project, we can ensure code quality, reliability, and consistency throughout the development process. CI testing helps identify and fix issues early, leading to faster release cycles and a more robust application.